

STEREO MOC Status Report
Time Period: 2016:347 - 2016:353

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 350, the STEREO project received authorization to continue ESA cross support for 2017.
- On day 351, during the DSS-25 support, turbo decoder lock was lost intermittently beginning at 2042z through 2122z. This anomaly resulted in the loss of 30 frames of SSR data.

2. The following spacecraft/instrument events occurred during this week. The Ahead observatory operated nominally during this week.

- On day 348, the 37th SECCHI stepped calibration was executed at 0655z for aphelion in the Ahead orbit. This was the 6th SECCHI stepped calibration roll to be conducted without gyro use.
- On day 353, the PLASTIC SSR science partition (#17) filled and began recording only housekeeping data at 0243z for 1.2 hours due to an unexpected shortage of track time.
- The average daily science data return for Ahead was 5.0 Gbits during this week.

STEREO Behind (STB) Status:

1. On day 348, NASA SCA^N honored the efforts for the first recovery attempt of STEREO Behind by presenting certificates of recognition to the teams at GSFC, DSN, and JHU/APL.

2. Detailed status of the recovery activities this week to restore operations is listed below.

- On day 351, during a 2.5 hour support with the 34m station DSS-26 using the 80 KW transmitter to minimize 70m contentions, 260 commands were transmitted during the support. No carrier was detected by either the DSN station

or the radio science receiver team after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.

- On day 353, during a 2.5 hour support with DSS-43, 260 commands were transmitted during the support. No carrier was detected by either the DSN station or the radio science receiver team after attempting to power on the TWTA for 30 minutes. Transitioned to battery recovery operations for the remainder of the support which consists of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off.
 - On day 353, during the DSS-14 support, commanding was delayed 32 minutes because the transmitter could not be calibrated. Once the issue was resolved, the uplink was successfully established and a total of 319 commands were sent during the support. The delay in commanding caused three command blocks to be missed. No carrier was detected by either the DSN station or the radio science receiver team during the support. See DR# G117691 for more information.
3. The Behind loss of communication anomaly occurred on October 1, 2014. Post superior solar conjunction, recovery operations resumed on November 30, 2015. By implementing the NASA Failure Review Board recommendations, the first recovery attempt began with carrier detection by the DSN on August 21st, through September 23, 2016. At a spacecraft range of ~2 AU, the observatory was found to be rotating slowly about its principal axis of inertia for which the uncontrolled attitude allowed some solar array input and continuous uplink and downlink communications on the LGA at emergency data rates. Over the next 22 continuous days, significant obstacles to recovery were overcome with a collaborative effort of the JHU/APL engineering team, NASA GSFC, DSN, FDF, SSMO scheduling, and Mission Operations teams. This consisted of:
- Reliably commanding a rotating spacecraft with uncontrolled attitude at a distance of 2 AU
 - How to power on the spacecraft that was never designed to be off without collapsing the battery voltage

- Acquiring telemetry at 35 bps from a spacecraft that is rotating with an uncontrolled attitude
- Warming a frozen propulsion subsystem with a degraded battery and limited solar array input with an uncontrolled attitude
- Configuring, loading, and verifying EA, C&DH, and G&C parameters and macros with very limited telemetry
- Conducting an autonomous momentum dump in the blind and transitioning to C&DH standby mode and successfully receiving telemetry on the HGA indicating star tracker lock and decreasing system momentum.

However, system momentum level remained above the threshold for re-establishing attitude control with the reaction wheels. Due to the uncontrolled attitude, communication degraded and the last detection of the carrier was on September 23rd.

Behind Observatory Status - From the last telemetry received on September 18th, main bus voltage is low, 2 out of 11 battery cells are currently not functioning, attitude remains uncontrolled, rotating at a ~45 second period about its principal axis of inertia. While propellant is suspected to be frozen, last telemetry indicated both propulsion tank latch valves are open and pressure transducer #2 is not functioning. EA mode is enabled. The battery charge rate is C/10. Necessary macro sequences have been tested to allow the peak power tracker in C&DH standby mode to protect the battery. These macro sequences will be loaded to EEPROM when the communications supports longer commands.

Monthly recovery efforts consist of attempting to power on the transmitter for 30 minutes. If no carrier signal is detected, battery recovery operations will commence which consist of repeatedly sweeping a 3 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off. The next recovery tracks are on January 20th, 21st, and 22nd.